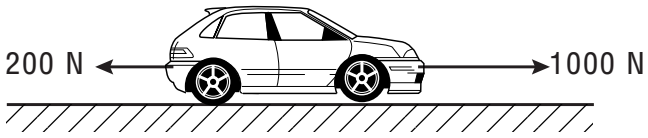
K Speeding up

End of unit test
Red

1 The diagram shows the forces acting on a car. It was not moving before the forces started to act.



a How big is the unbalanced force acting on the car? *1 mark*

b Will the car move forwards, move backwards or remain stationary? *1 mark*

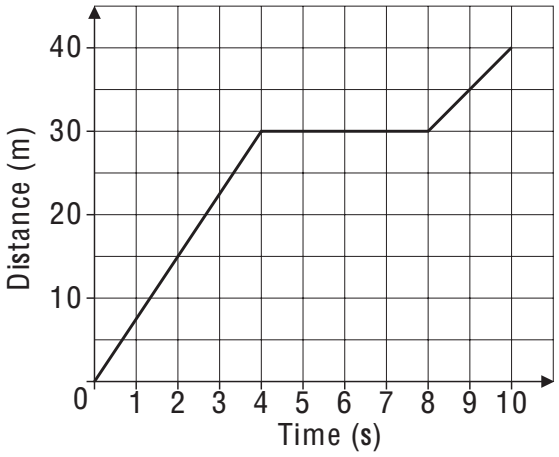
2 a Kim lives 5 miles from school. It takes her 15 minutes to get to school.

Priya lives 15 miles from school. It takes her 40 minutes to get to school.

Who travels at the higher average speed? *1 mark*

b Danny cycles to school at an average speed of 8 km/h. How fast does he cycle in m/s? Show your working. *2 marks*

3 The graph shows how far a cyclist travels in 10 s.



Use the graph to answer these questions.

a What was her average speed during the 10 s period? *1 mark*

b Between which times was she travelling fastest? *1 mark*

c When cyclists want to go fast, they often crouch down. How does this help them to go faster? *1 mark*

Speeding up (continued)

4 A model rocket takes off vertically. It has a weight of 1 N.

a The rocket motor gives it an upward thrust of 3 N.
What is the unbalanced upward force on the rocket? *1 mark*

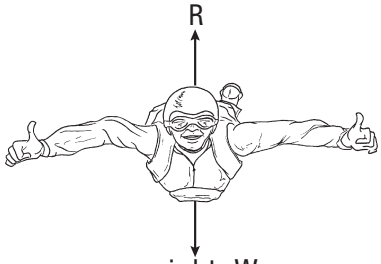
b How does the speed of the rocket change, if at all, just after the launch? *1 mark*

c The thrust of the rocket motor remains constant. As the fuel is used up, the mass of the rocket decreases.

i How does this affect its motion? *1 mark*

ii Explain your answer. *2 marks*

5 The diagram below shows a parachutist before he opens his parachute.



a i What happens to force R as the speed of the parachutist increases? *1 mark*

ii Use ideas about particles to explain why this happens. *1 mark*

iii What can you say about the speed of the parachutist when the forces W and R are equal? *1 mark*

b The diagram below shows a parachutist after opening his parachute.

i What happens to force R when the parachute opens? *1 mark*

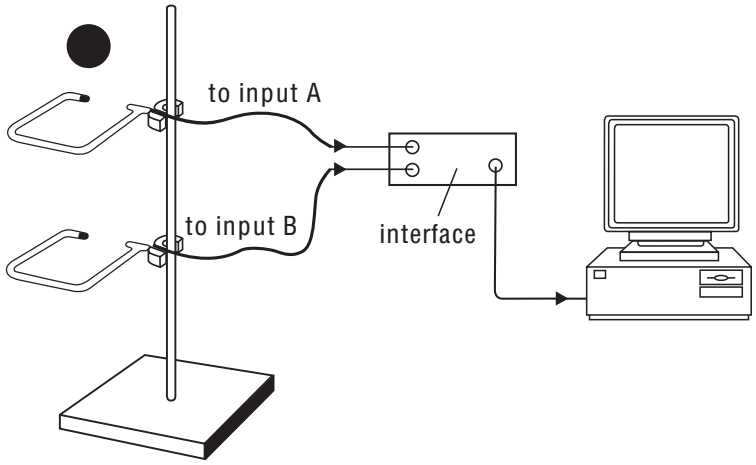
ii When the parachute opens, the parachutist slows down. Explain why this happens by referring to forces R and W. *1 mark*

iii Explain how R changes as the parachutist falls towards the ground. *1 mark*

iv What can you say about the speed of the parachutist when R becomes equal to W, compared with your answer in **a iii**? *1 mark*

Speeding up (continued)

6 Peter set up a datalogging experiment to measure the speed of falling objects. He set up two light gates and carefully measured the distance between them. He dropped the ball through the light gates, and this recorded the time it took for the ball to fall. Using the time and distance he could calculate the speed of the ball.



Peter could have done the experiment by dropping the ball and using a stopwatch to time the ball over the same distance as in the datalogging experiment.

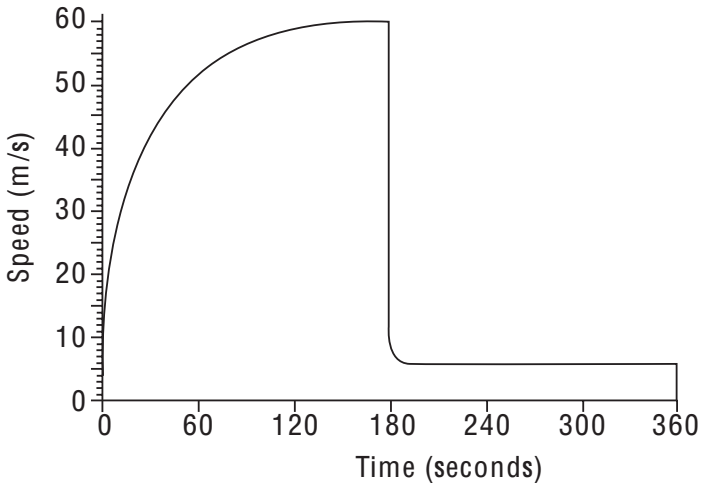
The results would be much less reliable than using the datalogger and light gates.

a Suggest why the timing would be less reliable. *1 mark*

b Suggest why the distance would be less reliable. *1 mark*

c The stopwatch is accurate to 0.1 seconds. The datalogger is accurate to 0.01 seconds. Which would give the most precise results? *1 mark*

7 When doing research into falling objects, Peter found this graph. It shows the motion of a man jumping from a plane, opening his parachute and landing on the ground.



a How many seconds passed between jumping from the plane and opening the parachute? *1 mark*

b What was the change in speed when the parachute opened? *1 mark*